EVALUATING THE IMPACT OF ZERO-RATING SERVICES: AN IN-DEPTH LOOK AT FACEBOOK'S FREE BASICS IN EMERGING ECONOMIES

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EVALUATING THE IMPACT OF ZERO-RATING SERVICES: AN IN-DEPTH LOOK AT FACEBOOK'S FREE BASICS IN EMERGING ECONOMIES

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SUMMARY

Facebook has partnered with mobile carriers in multiple countries to launch its zero-rated service - Free Basics. Free Basics is a platform which hosts not only Facebook, but other select websites which are zero-rated as well. Facebook's Messenger application is also included on the platform. The platform works like the App Store or Play Store where developers can submit their websites, and after a review process will be hosted on the platform. It should be noted that Facebook website on the Free Basics platform does not contain any image or video content. Users have to be connected to a WiFi or pay data charges to be able to see the videos and images in the News Feed.

This Master's thesis evaluates the impact of the Free Basics platform in the countries it has launched. Advocates of net neutrality have criticized Facebook for implementing a zero-rating service. They argue that such a service will close off users from the rest of the Internet, and that they will remain in a Facebook-regulated walled garden. Facebook has argued that in developing countries, where Internet access is not as ubiquitous as Western Europe or North America, Free Basics can provide essential services to the population. Free Basics does host government services, job boards, medical websites and education websites on their platform. It could also serve as an initiation to the benefits of the Internet, encouraging more of the population to come online.

In the process of this research, it has been found that there is a lack of evidence-based research on zero-rated services and Free Basics in particular. This Thesis hopes to fill some of that gaps in the literature, by studying the program in seven countries - Kenya, Nigeria, Rwanda, Ghana, South Africa, Mozambique and Tanzania.

CHAPTER 1
INTRODUCTION AND LITERATURE

1.1 Introduction

Free Basics is an Internet service offered by Facebook in over 60 countries. Users on the service can access the content on the Free Basics application without any data charges. These types of services are known as zero-rated and have been controversial, especially Free Basics.

While Free Basics itself is a very recent program, there is a considerable amount of literature to draw upon to understand the policy and economic aspects of zero-rating services.

1.2 Zero Rating and Net Neutrality

Network neutrality is a principle of universal and nondiscriminatory access that aims to preserve the ability of any Internet user to connect to any lawful content or services on the Internet, and the reciprocal right to have their resources universally accessible to others on the Internet [1]. The term came from "Network Neutrality, Broadband Discrimination," a paper written by Columbia Law School professor Tim Wu in 2003 [2]. Network neutrality has been a major point of contention in the United States and around the world. Supporters of network neutrality contest that allowing price discrimination on the Internet can lead to anti-competitive behavior. Internet Service Providers (ISPs) may discriminate in favor of content produced by them or their partners. Smaller Internet companies may be pushed out of the market if they cannot pay the premiums charged by ISPs.

The history of net neutrality in the United States is long and contentious. In 2005, the FCC adopted the 4 principles to encourage broadband deployment and preserve and protect the open and interconnected nature of the Internet. The principles state that, "

1. Consumers are entitled to access the lawful Internet of their choice,

2. Consumers are entitled to run applications and use services of their choice, subject to the needs of law enforcement

3. Consumers are entitled to connect their choice of legal devices that do not harm the network

4. Consumers are entitled to competition among network providers, application and service providers, and content providers" [3]

In 2008, Comcast was found guilty of blocking file sharing technology, BitTorrent. By a 3-2 vote, the Federal Communications Commission found that the "cable company failed to tell its subscribers about the blocking, lied about it when confronted by the commission and tried to cripple online video sites that compete with its on-demand service" [4].

That rebuke by the FCC was overturned in court, as a federal court said that the FCC lacks the required authority to enforce the net neutrality principles it had set in action [5]. The FCC then tried to formalize these rules in 2010, but they were again blocked by a federal court [6]. In 2015, the FCC established new rules that enforced net neutrality by classifying Internet service providers as a common carrier under Title II of the 1934 Communications Act. Finally, under Chairman Tom Wheeler, the agency adopted Net Neutrality regulations that prohibited broadband companies from blocking websites, slowing connection speeds and charging for faster delivery of content [6]

The 2015 rules were challenged in court as well, but this time the courts sided with the FCC and allowed for the ruling to stay. But, in 2017 when Republican Ajit Pai, took over as FCC Chairman, the agency was able to undo the rules. The rules were officially undone on April 28, 2018 as they will become part of the Federal Register [7].

Critics of network neutrality have argued that ISPs should be able to price discriminate as they are providing a service to the content creators. They argue that such control is required to provide the incentives to invest in broadband infrastructure. Moreover, the

fears of pushing certain websites out would not come to fruition, as in a competitive ISP market, consumers would simply move to a different service provider if they cannot access the websites they wish. In 2017, the Federal Communications Commission in the United States undid the existing net neutrality based legislation.

Zero-rating services have become a new battleground for net neutrality. End users are not charged for data consumed by specific applications or services. They are called zero-rated services because the data usage cost of those applications is zero. Zero-rating services have become popular in many countries in the last few years. In the US, zero-rating has existed since the walled gardens of AOL and the like in the 1990s [8]. While initially immensely popular, they lost out to the falling costs of broadband connectivity to the larger Internet.

These zero-rating services have been referred to as a "positive" violation of net neutrality. They do not involve blocking or throttling of content but treat some content better than general Internet traffic. Zero-rating services have typically included social networks and video content. In this way, their walled-gardens become more "specialized service walls". Most of the major mobile carriers in the US have zero-rated services. Verizon, T-Mobile, Sprint and AT&T all have applications where they do not charge for data usage like NFL Live Stream, YouTube and HBO.

It is interesting to note that despite net neutrality being a contentious issue in the United States, zero-rating services was never explicitly prohibited by the FCC. In fact, in the 2015 order itself, the FCC said that zero-rating offerings should be treated on a case-by-case basis. They said that hat some zero-rating services might benefit consumers and competition, but others, depending on their structure, might restrict consumer choice, distort competition, and hamper innovation [9]. The FCC had opened inquiries into T-Mobile, AT&T and Verizon for their zero-rating practices. But after Chairman Pai took over in 2017, the investigations were dropped [10].

Applications that are zero-rated in the US have seen a significant uptick in usage. T-

Mobile's zero-rating platform "Binge On", has more than 40 video streaming services, including Netflix, Hulu, HBO Now, WatchESPN, FoxNews and Apple Music. In a report released in January 2016, less than 3 months after the launch of Binge On, showed that a major video service included in the platform saw a jump of 79% in daily viewers [11].

Zero-rating is a designation of applications or services that an Internet provider does not charge any data usage for. Typically, there is no financial transaction between the content providers and the mobile carriers. Many mobile carriers in the US offer zero-rated services to their customers. Zero-rating services are considered to be a violation of network neutrality principles. Critics of zero-rating services like van Schewick have argued that zero-rating services are anti-competitive and there is a discriminatory effect on the market [12]. For the United States, van Schewick has argued that zero-rating services like T-Mobile's Binge On violate the Net Neutrality rules at the time (those rules have been overturned since). Users are encouraged to use the zero-rated services disproportionately. She also argues that zero-rating services marginalize under-served communities because of the free speech threats.

On the flip side, zero-rating services are looked upon as a tool to encourage Internet adoption in emerging economies. Eisenach says that the zero-rated applications are not anti-competitive price discrimination but should be looked upon as a bundled good [13]. He argues that this "competitive price discrimination" is widespread in many industries and generally improves economic efficiency and increases consumer welfare. Zero-rating service will also add to the competitiveness of the wireless carriers that offer them giving more choice to the end-user. As zero-rating services do not block or foreclose any sources of information, there should be no threats to freedom of expression. It should be noted here that Eisenach's research was sponsored by Facebook while they were launching the Free Basics platform.

The debate around zero-rating services have taken a slightly different facet in emerging economies. Instead of arguing for zero-rating services from a market fairness and consumer

choice perspective, the argument was that it was a boon to the poor and under connected populace in Asia, Africa and Latin America. The rationale was that limited Internet access with minimal content was better than having no access at all. Gelpaya shows that there is an emerging body of evidence that this isn't a black and white issue [14]. Zero-rating services are attractive to individuals who have access to the full Internet as well, but most users still prefer to use the full Internet.

As Marsden has noted, different regimes have implemented net neutrality in different capacities [15]. He provides case studies on the status of network neutrality legislation in the EU, the US and some countries in Asia and South America. Net neutrality has been implemented by most nations he studied, but zero-rating services were permitted in many of the countries outside Europe. Marsden presents India as a unique case where Free Basics became the impetus to implement strong net neutrality regulations. Before Free Basics entered the Indian market, zero-rating services were prevalent and available through multiple service providers. But when Free Basics entered the market, it caused the Indian regulators to reevaluate their policies and they adopted strong net neutrality rules.

The United Nations Dynamic Coalition on Network Neutrality has created a zero-rating map. The map shows the number of countries that allow some form of zero-rating and gives information about their net neutrality laws [16]. As seen from the map, there are significant number of countries that have implemented zero-rating in some form or the other. Many countries have no legislation on the subject, effectively meaning that zero-rating services are allowed. India is the only case where the introduction of a zero-rated product has led to direct net neutrality protection.

User surveys of zero-rating users have shown that Free Basics does not necessarily reduce the costs enough to bring new users online. In a survey of telecom users in eight countries, the Alliance for Affordable Internet found that 88% of users of zero-rating have used the Internet before [17]. They also found 30% of users on zero-rated services started paying for access to the open Internet because they wanted to access websites and apps be-

yond what was offered for free. However, it should be noted that this survey was conducted in 2014, only one year after Free Basics was launched. Also, the survey sample sizes are considerably small. Using an online survey, they questioned 2000 people in 7 different countries. An online survey can only reach a limited audience in countries where mobile phones are the only connected device for many and digital literacy is low. The Alliance for Affordable Internet is also an activist organization, who are pro-net neutrality and do not consider Free Basics a viable service. The report also does not make use of regulator and industry data to validate their results.

What should be pointed out here is that there is lack of academic and unbiased research when it comes to Free Basics. A Facebook-funded paper on zero-rating is the most cited article on Google Scholar on the subject in the last 3 years. Similarly, on the other side, advocacy groups that strongly opposed Free Basics have conducted user surveys. No studies have looked at the effect on mobile service providers or utilized data from the telecom regulators.

1.3 The Debate over Facebook's Free Basics

On December 12, 2016, the Telecom Regulatory Authority of India (TRAI) released an order, "Prohibition of Discriminatory Tariffs for Data Service Regulations, 2016" [18]. Internet advocates celebrated the event as the order ruled in their favor and upheld the principles of net neutrality.

In February of 2015, Mark Zuckerberg, founder and CEO of Facebook, declared his company's interest in launching its Free Basics services in India [19]. Free Basics or internet.org as it was known at the time, is a Facebook application that allows users to access limited websites without any data charges. Facebook partners with wireless carriers, so they can offer the Free Basics application to their customers. In India, Facebook had partnered with Reliance Communications to launch the program [18].

India had multiple wireless carriers offering zero-rated services before the launch of

Free Basics. However, Free Basics went beyond the traditional zero-rated service. Typically, a single application is zero-rated. Facebook offers a suite of websites including government services, Wikipedia and news websites to their customers for no cost. In a country where only 35% of the population is online [20], Free Basics was touted as a service that could help bridge the digital divide. The debate around net neutrality and the ruling by TRAI, marked the first time the entry of Free Basics into a market had led to regulation against it.

In the United States, Facebook has been cautious in launching Free Basics. Even though zero-rating services have never been prohibited in the U.S., a number of factors could've contributed to their hesitation. During the net neutrality debates, most of Silicon Valley initially advocated for net neutrality [21]. Facebook, being a part of that group had posts from founder and CEO, Mark Zuckerberg [22] and COO Sheryl Sandberg [23] supporting the actions taken by action-groups campaigning for net neutrality. If Facebook had pursued Free Basics after this, it may have been viewed as a hypocritical act. Nevertheless, representatives from the organization did meet with the White House in 2016, to explore the possibility of Free Basics in the United States [24]. Similar to its strategies in emerging economies, the U.S. version of Free Basics would target low-income and rural Americans who cannot afford reliable high speed Internet.

Since the net neutrality rules were undone in 2017, Facebook could launch Free Basics in the United States without any challenges at the federal level. However, the rules only went into effect on April 23rd, 2018, this became possible very recently. Another challenge Facebook will have to overcome is the state legislatures that have imposed their own net neutrality rules in response to FCC's ruling [25].

1.3.1 A History of Free Basics

Free Basics in its first version was a lighter version of the Facebook website known as Facebook Zero. Released as 0.facebook.com the website contained the most essential features

and did not include data-heavy content like photos and videos. “It’s free and it’s fast” were the two biggest selling points in the initial blog post describing Facebook Zero [26]. The announcement was made at the Mobile World Congress in 2010 also informed attendees that Facebook had partnered with mobile carriers around the world to provide this text only version of their website for no data costs [27].

Facebook Zero was immensely successful in Africa. In the 18 months since its launch in 2010, Facebook saw a 165% user growth [28]. 50 mobile carriers across 45 countries offered Facebook Zero in its initial version. Moreover, the launch of Facebook Zero inspired other companies to offer similar text-only, data-light versions of their websites. Wikipedia, Google and Twitter made similar attempts, but none were as successful as Facebook Zero [29].

Mobile applications were not very popular at the time, especially in emerging economies, so Facebook’s mobile website (m.facebook.com) received a lot of traffic. Feature phones were, and still are a popular mechanism for mobile Internet access in emerging economies. These handsets had very limited memory and low processing power. They have limited browser capabilities and usually do not have applications in the same way smartphones from Apple or Google do. The popularity of these phones contributed to increasing traffic for Facebook’s mobile website.

Facebook acquired Israeli app developer Snaptu, in 2011 [30]. Snaptu specialized in building applications for feature phones and became critical to Facebook’s plan to grow in emerging economies. From this acquisition, Facebook Zero then became internet.org [31].

The internet.org endeavor was the first time Facebook attempted to portray its zero-rating services as an act of good-will. The goal stated wasn’t Facebook or user growth. The website said internet.org was attempting at “making internet access available to the next 5 billion people”. Facebook enlisted an impressive list of partners - Ericsson, MediaTek, Nokia, Opera, Qualcomm and Samsung, to “develop joint projects, share knowledge, and mobilize industry and governments to bring the world online” [32]. It also embarked on

Figure 1.1: Mark Zuckerberg on the cover of Time.

an aggressive media campaign to sell the idea as "doing good". In an interview with the New York Times, Mark Zuckerberg said "We're focused on it more because we think it's something good for the world," he said, "rather than something that is going to be really amazing for our profits" [33]. Zuckerberg was also on the cover of Time Magazine putting a spotlight on the internet.org initiative. The title of the story was "Mark Zuckerberg's Crusade to Put Every Single Human Being Online" [34].

In 2013, the internet.org application was launched. The application included zero-rated access to websites other than Facebook and Facebook Messenger as well. Launched first in Zambia, the first iteration included websites like AccuWeather, Go Zambia Jobs, and

Wikipedia [31].The platform also includes essential services website. Since then, it has expanded to 60 countries mostly in Asia, Africa and Latin America. Table 2.1 is a table of the 60 countries Free Basics is present in as of April, 2018.

The backlash against internet.org in India led to a number of changes on the platform. Initially, Facebook had defended the platform, saying it did not violate any net neutrality principles. After TRAI's comment period for consultations on net neutrality legislation, the Indian Department of Telecom released a report that opposed the internet.org platform. The report argued that Facebook's role as a gatekeeper to what websites could be accessed was a direct violation of the net neutrality principles [35]. In response to this, Facebook opened up the internet.org platform to allow applications from any entity to have their website zero-rated. Prior to this only Facebook partners were allowed to be on the platform. Developers were invited to the platform to submit their own websites to be zero-rated. The internet.org website states "by adding your website to Free Basics, you can grow your audience by providing affordable access to your services, scale the social impact you're already creating, and establish your brand early in emerging markets" [32]. In response to criticism that the name internet.org was misleading, Facebook officially changed the name to Free Basics in all communications and marketing[1]. Public outrage led to partners who would've had zero-rated version of their website on the platform like leading news websites like NDTV and Times along with India's biggest online retailer, Flipkart distanced themselves from Free Basics and issued public statements in support of net neutrality [36]. Meanwhile, Facebook's relationship with the most important decision-making body in this situation, TRAI, broke down. "Your urging has the flavor of reducing this meaningful consultative exercise designed to produce informed decisions in a transparent manner into a crudely majoritarian and orchestrated opinion poll," the regulator wrote. "Neither the spirit nor the letter of a consultative process warrants such an interpretation which, if accepted, has dangerous ramifications for policy-making in India" [31]. Soon after, TRAI ruled in

[1]This thesis will use the name Free Basics from now on to avoid confusion.

Table 1.1: Countries that have Free Basics

Country	Carrier 1	Carrier 2	Carrier 3
Angola	Movicel		
Anguilla	Digicel		
Antigua and Barbuda	Digicel		
Bangladesh	Grameenphone	Robi	
Barbados	Digicel		
Benin	MTN	Etisalat	
Bonaire	Digicel		
British Virgin Islands	Digicel		
Cambodia	Smart Axiata		
Cape Verde	Unitel	CVMovel	
Chad	Tigo		
Colombia	Tigo		
Curacao	Digicel		
Democratic Republic of the Congo	Airtel	Tigo	
Dominica	Digicel		
El Salvador	Digicel		
Gabon	Airtel		
Ghana	Airtel	Tigo	
Grenada	Digicel		
Guatemala	Tigo		
Guinea	Cellcom		
Guinea-Bissau	MTN		
Indonesia	Indosat		
Iraq	AsiaCell	Korek	Zain
Jamaica	Digicel		
Jordan	Zain	Umniah	
Kenya	Airtel		
Liberia	Cellcom		
Madagascar	Blueline		
Malawi	Airtel	TNM	
Maldives	Ooredoo		
Mauritiana	Mauritel		
Mexico	Telcel	Virgin	
Mongolia	G-Mobile	Mobicom	Skytel
Mozambique	Mcel		
Myanmar	MPT		
Niger	Airtel		
Nigeria	Airtel		
Pakistan	Telenor	Zong	
Panama	Digicel		

Table 1.2: Countries that have Free Basics (continued)

Country	Carrier 1	Carrier 2	Carrier 3
Peru	Bitel		
Philippines	Globe	Smart	
Republic of Congo	Airtel		
Rwanda	Airtel		
Saint Kitts and Nevis	Digicel		
Saint Lucia	Digicel		
Saint Vincent and the Grenadines	Digicel		
Senegal	Tigo		
Seychelles	Airtel		
South Africa	Cell C		
Suriname	Digicel		
Tanzania	Tigo	Airtel	Vodacom
Thailand	DTAC	TrueMove	
Timor-Leste	Telkomcel		
Vanuatu	Telecom		
Vietnam	Mobifone		
Zambia	Airtel		

favor of net neutrality and the Free Basics program was ended in India.

The leadership at Facebook has consistently positioned themselves as do-gooders trying to bridge the digital divide. Representatives from Facebook consistently met with world leaders in an attempt to portray Free Basics as a public policy solution [31]. Mark Zuckerberg, himself had high profile meetings with world leaders like President Santos of Colombia and Prime Minister Modi of India.

Facebook received a considerable amount of criticism for their philanthrocapitalistic image of Free Basics. A consequence of the debacle in India, was that other countries started reviewing their net neutrality rules and began questioning if Free Basics was indeed a beneficial service. Since then, there has been a considerable dialing back of public activity around the program.

Although Free Basics may no longer be in the public eye, it is still the biggest zero-rated service in the world. While Facebook does not reveal how many individuals are on Free

Basics, no other service is in as many countries. Many observers believed that the exit from India was the beginning of the end for the service [37]. However, that is far from the case. As this thesis will explore, millions of individuals have access to Free Basics, and free data is a huge incentive to Internet users, especially in emerging economies. Mobile carriers continue to seek to provide Free Basics to their users, even though there is no financial gain. There are also privacy and access concerns that the application has posed which have not been addressed by Facebook. This thesis attempts to understand part of the Free Basics ecosystem and hopefully answers some of the many questions surrounding the service.

1.4 The Digital Divide in Emerging Economies

The digital divide describes a gap in terms of access to and use of information and communication technology. Traditionally, the digital divide was considered to be between those who have access to the Internet and those who do not. With the advent of mobile Internet, the term also means to represent other disparities such as bandwidth or technology literacy [38]. Martin Hilbert describes the digital divide as "who, with which characteristics, connects how to what" [39].

A big part of Free Basic's value proposition was that it will bridge the digital divide. As explained earlier, the Free Basics website states that they are "making internet access available to the next 5 billion people" [32].

There are two main divides Free Basics can potentially resolve: the divide in Internet penetration rates between developed countries and emerging economies and the divide between rich and poor within a country. For that reason, we will focus on those two definitions and aspects of the digital divide, bearing in mind that the divides in gender, language and others play a major role in Internet access rates in a country.

Existing literature has analyzed the divide in connectivity between emerging economies and the rest. Often, less than half the population has access to the Internet in emerging economies [40]. Compared to that, countries like the US, UK, France, Canada and South

Korea all have over 80% of the population online.

The gap between these countries has been closing. Internet access is growing, especially via mobile devices. The Pew Research Center published a report in 2016 [41], surveying the growth in Internet connectivity in emerging economies. The survey found that Internet access via a smartphone grew by 10 percentage points or more in countries like Turkey, China, Brazil and Malaysia. An important observation made by the authors was that younger, more educated individuals were more likely to use the Internet in all countries. A perhaps obvious finding was that there is a strong correlation (0.87) between country wealth and Internet access.

Analyzing the global digital divide has been an important part of technology policy research for close to two decades. Petrazzini et al. in 1999, wrote about the inequalities in Internet "hosts" between emerging economies and developed countries [42]. The article showed that there was a huge difference in the costs of Internet access after adjusting for purchasing parity power (PPP). For example, end-user costs as a fraction of GDP per capita was 400 times more in Kenya (which has Free Basics) than the US.

Darrell West in a 2015 Brookings report, "Digital divide: Improving Internet access in the developing world through affordable services and diverse content" [43] points out some of the reasons for this huge divide. The costs of Internet usage in emerging economies are often much higher. There is a digital literacy barrier, especially when it comes to the older population. Third, technology is not as multilingual as it can be. For a country like India, which rejected Free Basics in 2015, with 23 constitutionally recognized languages and 500+ regional languages, the barrier to connectivity is very high.

Another barrier to connectivity was pointed out in a study of mobile sector taxes in 19 countries by Deloitte for GSMA [44]. Places such as Mexico, South Africa, Bangladesh and Malaysia have "connectivity taxes" which raise costs to Internet access. Connectivity taxes are a variable charge based on the amount of Internet usage, as opposed to traditional flat taxes present in the US and other Western democracies. Most of these countries also

have wireless carriers offering Free Basics. According to the study, "If this tax burden was decreased by one percentage point, its researchers estimated that mobile broadband penetration would increase by 1.8 percentage points and economic growth would rise by 0.7 percentage points."

In the United States, the digital divide has been studied for many years. In the 1990s, the National Telecommunications and Information Administration (NTIA), published the first reports about Internet access and its usage [45]. The NTIA report addressed the digital divide as one of America's "leading economic and civil rights issues". The report also used the terms "haves" and "have-nots" for individuals with and without access to the Internet. In 2015, an NTIA survey showed that 25.8 million households (21% of total households) in the United States did not have access to the Internet [46]. Most respondents in the survey said that their main reason for not accessing the Internet was because of cost. There is also a notable gap in the number of urban and rural respondents accessing the Internet. The results also show that minorities have a lower rate of Internet usage as compared to White Americans. Similar differences are seen on the basis of age, income and education.

This shows that even though the United States, is a developed country and a western democracy, the digital divide is persistent. Multiple initiatives have been launched by the United States Government to bridge this divide, yet more than 20% of the country remains unconnected to the Internet [46].

At a global level, Internet access has now been declared a human right [47]. Although, the declaration was part of a report that condemned Internet shutdowns and authoritarian governments attempting to curb freedom of expression online, it made important observations regarding how crucial Internet access is for socio-economic equality in a society. The United Nations has invested in multiple programs to bridge the digital divide on a global scale, including the formation of an Information and Communications Technologies (ICT) Task Force that was called on to "to help build digital bridges to the billions of people who are now trapped in extreme poverty, untouched by the digital revolution and beyond the

reach of the global economy" [48].

The United Nations also coordinates with the International Telecommunications Union (ITU) on Internet access programs. The ITU has stated that addressing the global digital divide is pivotal, if they are to meet the Global Development Agenda by 2030 [49]. A report by the Broadband Commission, an ITU sponsored commission, said that "3.5 billion people will be using the Internet by 2017, up from 3.2 billion last year and equating to 47% of the global population" [50].

1.4.1 The Facebook Divide

As an extension of the digital divide, researchers have investigated the "Facebook divide" as the difference between individuals and societies that use Facebook. While still an understudied phenomenon, Yung has hypothesized that individuals that are not on Facebook, may miss out on specific types of information access [51]. Yung, claims that there is an accumulation of both bonding and social capital that cannot be acquired elsewhere. The paper says, "For instance, live video might allow viewer to take first-hand information to make political decision; breaking news post from major news services allow a person to make investment decision; a check-in activity on Facebook allow a user entitle to discount or gifts on spot; pages and groups activities allow unknown people come together and increase their social capital". The paper makes these claims without any empirical analysis using data from Facebook. To prove such a hypothesis, it would require a study of qualitative and quantitative data from numerous Facebook users and non-users. Furthermore, these claims are dubious because more rigorous studies have shown that there is a considerable negative effect on mental health associated with Facebook usage [52].

1.5 The Walled Garden

The term "walled garden" was created by media owner John Malone, in the mid-1990s to describe a closed technology platform or ecosystem where the carrier or service provider

has control over applications, content and media, and restricts convenient access to non-approved applications or content [53]. The term has since been applied to many telecommunications platforms, starting from the pre-regulation Bell System in the 1970s, to AOL in the 1990s and now with mobile operating systems like the Apple's iOS and Google's Android.

Since the advent of electronic communication, the Bell Telephone Company and later AT&T have featured prominently. Their historical, state-sanctioned monopoly arguably impacts telecommunications policy to this day [54]. But, delving into that history is outside the scope of this thesis. Yet the uniqueness of the Bell system is worth noting.

The Bell system was a sanctioned monopoly by the Telecommunications Act of 1934 post the Kingsbury commitment [54]. It was also a vertical monopoly and prohibited its customers from connecting phones that were not sold by Bell to the system without paying a fee. This policy was implemented, in part, to ensure that competitors do not get any traction in the market. A landmark case was Hush-a-Phone v. United States, where a company sold a small plastic attachment to the Bell phone to make conversations private [55]. Initially, the FCC had ruled in favor of the Bell Telephone Company, arguing that the device could "result in a general deterioration of the quality of telephone service" [56]. Although the Court of Appeals ruled in favor of Hush-a-Phone eventually, it showed the level of control exerted by Bell on their devices with the cooperation of the Federal Government [57].

In the 1990s, America Online (AOL) was the single most successful Internet service firm in a still nascent market. AOL's costumers could only access content dictated by AOL. The term, "walled-garden" was coined to describe the AOL platform. What now one would access different websites, users would browse pages on AOL. AOL enjoyed tremendous success in the early years. But by the end of the decade, cable companies started offering broadband connections, which were faster and more reliable than the dial-up service AOL still ran on. AOL's huge customer base started to decline as customers started to prefer broadband over dial-up. Moreover, there was no walled-garden in the

connections with those companies. Users could access any website they wanted and the popularity of search engines like Yahoo and later on Google, lowered transaction costs in navigating the Internet. Users who quit AOL, did not have any incentive to come back. Coupled with a disastrous merger with Time Warner, AOL lost most of its market share and had to shut down their platform and dial-up service [58].

The smartphone ecosystem has also been conceptualized as a walled garden. Zittrain has said that the iPhone and iOS ecosystem's popularity is partly "to do with the reliability of the device arising from every part being put there or approved by the same vendor" [59]. The Apple iPhone is designed so that it cannot run any other operating system. On the App Store, the program used to download applications on the phone, only applications approved by Apple are available. The argument was, that smartphones, which were just beginning to take off, might actually limit what users could do online compared with devices such as personal computers [59].

Since that time, Apple has created a music store, and the songs downloaded from that store, could be listened to on Apple's devices or software. It has also created a messaging service that is only for iPhone users. Apple has also had a dodgy history of banning applications from the App Store without much justification [60]. But, unlike AOL, Apple did not suffer a downfall, or hasn't yet. In fact, it has set the standard for other competitors to imitate [61]. In August 2017, Apple said services generated more than $7 billion in the quarter, and CEO Tim Cook took pride in saying the division is now the size of a Fortune 100 company [62].

Others have described large social media platforms, such as Facebook, Instagram and Twitter as walled gardens as well. The content regulation practices of these websites have been scrutinized and often criticized. In 2012, there was backlash against a guidebook for moderators that was made public. The guidebook revealed "that images of breastfeeding would be banned if nipples were exposed, but deep flesh wounds and crushed heads would be OK" [63].

Part of the concern created by Facebook-style walled gardens is that search engines like Google, which opened up the Internet and were instrumental in bringing down AOL, cannot access most of the content. Battelle, an online advertising executive has said that, "The old Internet is shrinking, and being replaced by walled gardens over which Google's crawlers can't climb" [64].

1.5.1 The Walled Garden and Net Neutrality

Walled gardens on the Internet can violate the principles of net neutrality in some form. By definition, equal access, is diametrically opposed to the concept of a walled garden. Wu claims that the Time Warner-AOL merger failed because of net neutrality [58]. AOL offered sole access to Time Warner content, but individuals were free to access any other website through other search engines. Historically, consumers' preference for less limited choices has defeated defeated rigorous walled gardens. And although Apple's ecosystem is closed, at the content layer they do not control what website you visit or what video you watch. Similarly, Facebook does not stop individuals from linking stories and videos to other websites.

Often the fears around walled gardens, are more about business models than principles. Services like Facebook, Twitter, products like the smartphone have changed the way individuals access and use the Internet. To access an application on your smartphone, you do not need to go to a browser, a prerequisite with the personal computer. Social media websites have served as composites for communicating across the Internet, entertainment and as news sources; often eliminating other websites solely dedicated to one of these purposes. Newer devices and applications like the Amazon Alexa, bypasses Google's search engine for accessing the Internet and may one day threaten its market dominance.

Having said this, there are genuine concerns regarding these platforms, even though they may not be walled gardens in the traditional sense. Surveys have shown that considerable number of users in emerging economies believe that the Internet and Facebook is the

same thing [29]. Internet users who believe so may miss out on the benefits and information available on the Internet. This also creates an extremely hostile environment for any competition. Lower digital literacy rates and Facebook's first mover advantage may have contributed to effects like these.

Free Basics encourages even more exclusive usage of Facebook and its services. This thesis will explore the impact of this program in the context of a walled garden and assess the impact it has on Internet usage and competition.

CHAPTER 2
RESEARCH QUESTION

As noted in the previous chapter, Free Basics has invoked many responses on both sides of the debate. However, there is a dearth of empirical research on the program, especially in the literature surrounding the incentives and market dynamics of the mobile carriers that offer Free Basics to their customers. Free Basics is controversial for violating principles of net neutrality, but potentially provides a much more affordable option for Internet access in emerging economies. Many critics have raised concerns regarding Facebook's walled garden and Free Basics being anti-competitive, but it can also be argued that the Free Basics application is simply bundled with a subscription to the mobile carrier.

Technically, individuals have access to all basic features of the Internet through Free Basics. Facebook offers an email service, a search engine, news and information websites (such as the BBC and Wikipedia) and its instant messenger known as Messenger. However, Facebook is the most popular social media website in the world with more than 2 billion users as of last year [65]. The addictive and detrimental effects of Facebook have been researched and well documented [52]. Keeping that in mind, there are legitimate concerns on the increased social media usage because of a zero-rated application. One of the questions this thesis will try to answer is 1) how does Free Basics affect Internet user behavior?

Mobile carriers that offer Free Basics, accommodate this extra bandwidth on their networks for which they do not get any payment. Free Basics is designed to be a low data-consuming application, which does not load videos or images [66]. But, with the range of applications offered, a considerable amount of data can be consumed by Free Basics. Presumably, carriers offer Free Basics to attract new paying customers to their service as there is no cash transaction between Facebook and the mobile carrier. Offering a zero-rated application can be a market differentiator. As seen in the literature, the effective cost of In-

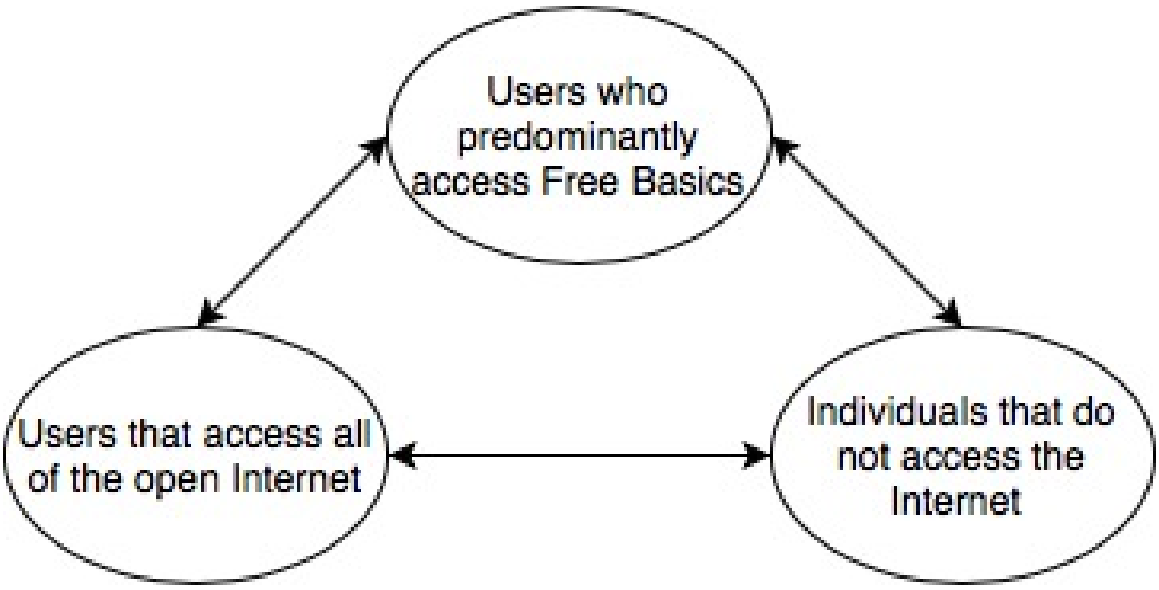

Figure 2.1: Flowchart of potential migration patterns

ternet access in emerging economies is high. Zero-rating can serve as a big incentive to join a particular mobile carrier. Hence, the second question the thesis will attempt to answer is 2) is offering Free Basics beneficial to the mobile carriers?

Finally, most of the arguments for and against Free Basics are structured around its effect on Internet usage and access. Proponents argue that Free Basics can bring more people online and bridge the digital divide. Detractors have claimed that it will discourage users to go beyond the applications and they will be satisfied with the ”limited” Internet. We can imagine three distinct groups of individuals in countries where Free Basics is offered. The first group are individuals who are not online - they do not have any Internet on their phones in any capacity. The second group are individuals who have Free Basics on their phones, but do not use the fuller Internet. They limit their usage to the Free Basics application for the most part. It is important to note here that even though these users have Free Basics, they can access the rest of the Internet by paying for data usage or connecting to a WiFi network. The third group consists of individuals who use the full Internet and are not limited by Free Basics. The final question the thesis will attempt to answer is 3) how does the introduction of Free Basics affect the migration patterns between these three groups?

Is Free Basics bringing people online or is it discouraging them?

CHAPTER 3
DATA AND METHODOLOGY

3.1 Data

This thesis will utilize three distinct data sources to answer the research questions posed in the previous chapter - survey data, Internet Access data from regulators and the ITU (International Telecommunications Union) and shareholder reports from mobile carriers.

3.1.1 Survey Data

Research ICT Africa (RIA) conducted the After Access Internet usage survey in 2017 of 7 countries in Africa. This survey goes ”after access” to collect data on social networking, cybersecurity awareness and practices, digital finance, microwork and others aspects of sharing economy [67]. They have sampled 9000 individuals for this survey, across seven countries in Africa - Kenya, Mozambique, Nigeria, Ghana, Rwanda, South Africa and Tanzania.

While the data has not been shared publicly, RIA has very generously agreed to provide part of the data for this thesis. The modules shared include a module on mobile phone activity and another one on Internet usage. The module on mobile phone activity, has 39 questions related to device type, mobile carriers, mobile applications and usage frequency. The module on Internet usage has 20 questions on digital literacy, online behavior, usage frequency and affordability.

This survey data will be used to get an understanding of the Internet access rates and the shape of the digital divide in these countries. An important data point from this would be to understand the extent to which price is a barrier for Internet access. The information will be useful to understand the appeal to regulators in these emerging economies to sanction

zero-rated services.

The Internet usage and preference questions focus on what activities are most important and popular amongst the respondents. The popularity of social media applications like Facebook and messaging applications will be measured from these questions. That will be useful to understand the appeal of zero-rating to end-users, who can afford Internet access and may already have it.

Additionally, by comparing social media usage frequencies of users on carriers that are zero-rated to that of those who are not on zero-rated carriers, we can understand the impact an application like Free Basics has on online behavior.

More details on the survey methodology are available in Appendix A.

3.1.2 Regulator Data

Most countries have telecommunications regulators tracking the number of Internet users in their country annually. Often, there are breakdowns of individuals who connect on different devices and carriers. This data is necessary to get an account of Internet access rates in the countries taken into account.

A few of them also publish mobile number portability data. The mobile number portability data gives an account of individuals who have switched mobile carriers in the last year, recording the previous and current carrier. The data would show if users are switching to carriers that are zero-rated.

While most countries have annual reports, a couple of countries (Kenya and Ghana) provide monthly updates.

Another useful data source for Internet access rates around the world is the ITU's ICT Facts and Figures reporting. The ITU (International Telecommunication Union) publishes the report annually including data on mobile-cellular subscriptions, Internet use, fixed- and mobile-broadband services, household ICT access, and more [68]. The ITU is a United Nations (UN) specialized agency for Information and Communication Technology (ICT)

Table 3.1: Countries that have Free Basics (continued)

Country	Regulator
Ghana	National Communications Authority (nca.org.gh)
Kenya	Communications Authority of Kenya (ca.go.ke)
Mozambique	The National Communications Institute of Mozambique (incm.gov.mz)
Nigeria	Nigerian Communications Commission (www.ncc.gov.ng)
Rwanda	Rwanda Utilities Regulatory Authority (rura.rw)
South Africa	Independent Communications Authority of South Africa (www.icasa.org.za)
Tanzania	The Tanzania Communications Regulatory Authority (www.tcra.go.tz)

and its statistics informs decision making for the UN's policy proposals.

The ITU also has a global ICT development index that tracks ICT development by measuring statistics like percentage of individuals using the Internet, active mobile-broadband subscriptions, bandwidth rates, device penetration rates, cellular subscriptions and total number of Internet users [69]. This index helps provide a latest ICT landscape and understand the impact of global ICT programs. It is also an important statistic in studying the global digital divide.

Additionally, there are statistic compilers that use data from multiple sources such as market reports and regulator data. Internet World Stats is a dataset that has these statistics from over 200 countries and has been used for this thesis [40].

3.1.3 Mobile Service Provider

Mobile service providers publish annual reports for their shareholders which detail their growth and usage in different countries. Typically, they contain data regarding the number of users they have in each country and the revenue they've earned.

The primary use of this data will be to measure the growth rate of carriers that offer Free Basics and compare them to carriers that do not in that country. This will give us an indication to the impact of offering Free Basics and the value it adds to the mobile carrier.

Table 3.2: Countries and Free Basics carriers included in the survey

Country	Carrier 1	Carrier 2	Carrier 3
Ghana	Airtel	Tigo	
Kenya	Airtel		
Mozambique	Mcel		
Nigeria	Airtel		
Rwanda	Airtel		
South Africa	Cell C		
Tanzania	Tigo	Airtel	Vodacom

It will also give us an understanding of the incentives for a mobile carrier to offer Free Basics.

In the seven countries that will be studied in depth for this thesis, there are 5 different carriers that offer Free Basics. The number of carriers that offer Free Basics in each country, range from one to three.

3.2 Dependent Variables (DV)

As outlined in the chapter above, this thesis will draw on multiple data sources to analyze the zero-rating services through the lens of Free Basics. As discussed earlier, there are concerns that a service like Free Basics would mean that users are on Facebook and the application more often and do not access the rest of the Internet. Users may miss out on the many socio-economic benefits of the Internet if they do not have full access. Moreover, as pointed out in section 1.4.1, there are multiple research papers that have shown excessive Facebook usage to be detrimental to mental health [52]. Therefore, it is important to understand what impact Free Basics has on social media usage.

3.2.1 DV: Social Media Usage

The RIA After Access survey asks questions on mobile usage activity in Module M: Mobile Phone. Question M19 specifically asks regarding the frequency of using Social Networking

Apps like Facebook. For the dependent variable, a composite variable of the respondents answering they use the applications more than once a week was constructed.

3.2.2 DV: Most Important Online Activity

Module B of the survey asks users to rank which activities are most important to them, choosing from a list of eight: social networking, work related, shopping, government services, job searching, online banking, education and other. A dependent variable was constructed including respondents that ranked "social networking" as the most important online activity.

3.2.3 DV: Alternate Internet Access

Questions B14-B17 in Module B of the survey focus on limitations of Internet usage. They also ask respondents regarding data saving strategies, such as data promotions or using a public Wi-Fi. From these questions, we can gauge if users with Free Basics are more likely to access the Internet through other means than users not on a carrier with Free Basics. A dependent variable was constructed including these respondents to create a metric for alternative Internet access.

CHAPTER 4

FINDINGS

This chapter lays out the results obtained from the datasets described in the previous chapter.

4.1 Survey

The methodology used for the After Access surveys delivers nationally representative indicators for households, individuals, and informal businesses. Using Enumerator Areas (EA) of national census sample frames as primary sampling units, and sampling households and businesses from created listings simultaneously allows to survey two different users groups during a single survey at a minimal cost [67].

4.1.1 Internet Access and Device Ownership

The RIA survey covered 9613 respondents in seven countries. Table 4.1 highlights the digital divide and digital literacy issue in these countries.

Digital literacy is often considered to be a prerequisite to bridging the digital divide. The literature has shown that there is a correlation between a country's economic growth and HDI (Human Development Index) and the digital literacy rate [70]. The data from this survey clearly corroborates that. In countries where English is not the most spoken language, the technology barrier can seem even steeper. All seven countries have considerable number of individuals who do not speak English as their first language. The countries with a higher HDI, South Africa and Kenya, have a higher number of respondents who are aware of the Internet. The country on the list with the lowest HDI (Rwanda), also has the least number of respondents aware of the Internet [71]. Of the 9613 respondents to the survey, 5008 or 52.1% of respondents are aware of the Internet.

Table 4.1: Device and Internet Penetration

Country	Number of Respondents	Internet Awareness (Percent)	Internet Usage (Percent)	Mobilephone Ownership (Percent)	Smartphone Ownership (Percent)
Ghana	1200	50.08%	25.92%	77.83%	25.75%
Kenya	1208	66.39%	36.42%	88.91%	33.86%
Mozambique	1171	48.68%	20.32 %	56.96%	15.88%
Nigeria	1808	51.44%	29.70%	65.27%	16.54%
Rwanda	1211	26.75%	14.20%	54.50%	10.65%
South Africa	1815	65.40%	45.67%	85.51%	43.86%
Tanzania	1200	49.50%	22.17%	66.50%	20.33%

The numbers are lower for Internet usage. None of the countries have more than half the respondents online. The highest is South Africa with only 45.67% of the respondents saying they have used the Internet. The lowest is in Rwanda where only 14.2% of the respondents have accessed the Internet.

It should be noted however, that in emerging economies where initial Internet access is through platforms and large websites, individuals may not be able to distinguish between the Internet and their messaging application or social media network of choice. In fact, a survey has shown many people to believe they are not on the Internet, while using Facebook [29]. This could have contributed to the low numbers of Internet usage and awareness rates seen here.

Statistics on device ownership show the progression of ICT technology in these countries. All countries have at least half of the respondents in possession of a mobile phone. The highest being Kenya with 88.91% and the lowest Rwanda with 54.5%. 71.41% of the total respondents own a mobile phone. The numbers with smart phones are much lower, and there is a stark contrast amongst the countries. 43.86% of South African respondents own a smartphone, but only 10.65% of Rwandan respondents own a smartphone. The overall number is 24.67%.

The definition of smartphone has been extended to include feature phones as well. Feature phones are devices that do not necessarily allow users to download applications on their phone, but they have limited browser capabilities that can be used to access mobile friendly versions of their desired websites. For the purpose of this thesis, feature phones are considered to be smartphones.

4.1.2 Internet Usage and Zero Rating

Of the respondents who were aware of the Internet, 63.5% said they faced limitations for using the Internet. Table 4.2 shows that 42.95% of respondents said that cost of data was their biggest issue. As discussed earlier, the literature has shown that the effective cost of Internet is much higher in emerging economies as compared to developed economies. The response to this survey corroborates this result.

The dependent variables described in the previous chapter were used to run three separate linear regressions. All regressions were controlled for the demographic information provided in the survey modules A, H and IE. The models were linear parsimonious models and were computed using the statistical software R.

Internet users on carriers with Free Basics were 25.74% more likely to say that they have high social media usage (R-squared = 0.30). It can be assumed to be a natural consequence of having access to data that you do not need to pay for. If close to half of respondents are concerned about data costs, it is likely that an application for which they do not pay any data costs would be used more frequently. Also, it should be noted that ”social media” has been explained as Facebook, Twitter or Messenger in the survey. Considering that Facebook is immensely popular in these countries, and the relatively slower growth of competing services like Twitter, it is safe to assume that ”social media usage” for respondents would consist primarily of Facebook [72].

Internet users on carriers with Free Basics were 37.68% more likely to say that social media activity is the most important activity they perform online (R-squared = 0.44). Also,

Table 4.2: Limitations for Internet Usage

Limitation for Usage	Percentage of Respondents
Nothing, No Limitation	18.08%
Lack of Time	16.30%
Data Cost	**42.95%**
Language Barrier	1.64%
Internet Speeds	11.24%
Privacy Concerns	1.92%
Security Concerns	0.48%
Not Allowed by Family	0.82%
Find it Difficult	1.10%
Other	5.48%

perhaps counterintuitively, respondents on carriers with Free Basics were no more likely (0.06%) than respondents on other carriers to use a data saving strategy such as wait till they are at home or work or on a public Wi-Fi to access the Internet (R-squared = 0.27).

Looking at these two statistics it would appear that the respondents on Free Basics are as content with their data availability as users on other carriers. It may be that the users that value zero-rating and Facebook more than others choose carriers that have Free Basics. However, it is also possible that having the option of free access to Facebook makes them use it more. This could also be the reason these respondents said that social media is the most important activity to them on the Internet.

A positive highlight from the survey is that very few individuals do not use the Internet because of a language barrier or because they find it difficult. This is an important step in bridging the digital divide.

4.1.3 Multiple SIM cards

2202 of the respondents, or 32% of respondents who own a mobile phone use multiple SIM cards. Over half of those respondents (53.36%) said that they used a second SIM card to make cheaper calls on the same network. In all of the countries surveyed, it is not regular practice for outgoing and incoming calls to be free across networks like it is in the United

Table 4.3: Reasons for having a second SIM card

Reason for Second SIM Card	Percentage of Respondents
Cheaper Calls on the Same Network	53.36%
Take Advantage of Promotions	48.91%
In Case of Reception Issues	36.10%
Use Free Social Media	19.57%
Dedicated SIM for Data	24.66%

States [73]. The number shows that in these telecom markets, the marginal cost of making a call is high enough to warrant having two or more SIM cards. Usually calls on the same carrier are differently priced, making it useful to have a different SIM card for different sets of people.

48.91% of respondents who had a second SIM card said that they use it to take advantage of promotions. To attract new customers to the market, there are many ”promotional schemes”. For example, MTN Ghana offered customers their first 2GB of data free when they signed up for a new SIM card [73].

19.57% of respondents who had a second SIM card said that it was to get ”free social media”. The question, as stated, relates to zero-rated social media promotions or applications. 93.22% of these respondents listed a mobile carrier that carries Free Basics as their second SIM card. These respondents found the Free Basics platform appealing enough to have a second SIM card just for the free data. It is also important to note that the question poised was free social media and not any of the other services the Free Basics platform offers. It is possible, that some respondents joined a Free Basics carrier for the other zero-rated services such as Wikipedia. Unfortunately, those respondents are not collected by this question.

These 271 respondents' behavior was not collected in the earlier analysis of users on zero-rating services. They were excluded because there are definitely certain restrictions in managing two SIM cards. If the users do not have a dual-SIM phone or two phones, swapping between the two carriers is not seamless. Their Internet usage behavior would be

different to that of individuals who claim a zero-rated carrier as their ”primary” carrier and would have skewed the model. Also, important to note is that none of the 271 respondents who have a Free Basics on their secondary carrier for free social media, have another Free Basics on their primary carrier as well.

4.2 Carrier and Regulator Data

Across the seven countries in the survey, there are five mobile carriers that offer Free Basics - Airtel, Tigo, Vodacom, Cell C, MCel. To study the incentives for carriers to offer Free Basics, it is important to analyze the cellular market in these countries and the market of these five carriers. As statistics from 2018 from all markets are not available, the data shown below is the last available data in 2017.

4.2.1 Market Share and Subscriber Growth

Studying the most popular subscribers in each country, it seems that the carrier with Free Basics is rarely a market leader.

Hypothetically, a major incentive for mobile carriers to offer Free Basics is that they would gain more subscribers than their competitors as consumers would be attracted to the zero-rated content. Yet, the growth seen by the carriers that offer Free Basics does not seem to be any higher than carriers that don’t offer it.

In the tables that follow, the carriers that carry Free Basics have boldface.

Ghana

As reported by the National Communication Authority (NCA), in Ghana, Tigo and Airtel, the two carriers that offer Free Basics are 3rd and 4th in market share respectively [74].

In the last three years, Tigo and Airtel have not seen any more growth in subscribers than their competitors. Like most emerging economies, the Ghanaian telecom market is

Table 4.4: Ghana Carrier Market Share in 2017

Carrier	Market Share
MTN	47.58%
Vodafone	24.25%
Tigo	**14.66%**
Airtel	**11.36%**
Others	2.15%

growing, and all carriers are adding new consumers. However, the rate at which Airtel and Tigo has added new consumers is not higher than MTN or Vodafone.

In 2015, Airtel Ghana added new customers at a rate of 2.3% growth per month. There was a considerable bump in April of 2015 on the introduction of Free Basics with a growth rate of 5.2% that month. However, since then, Airtel's growth rate has fallen and has been losing customers. In 2016, Airtel Ghana had a growth rate of 0.6% and in 2017 the rate was -1.7% [75] [74].

Tigo Ghana, saw a bump when it added Free Basics too of 3.5% in October 2015 and of 3.2% in November 2015. The average monthly growth rate for Tigo in 2015 was 1.7%. In 2016, the growth rate remained steady at 1.2%, and in 2017 at 1.8% [74].

During the same time, MTN had an average monthly growth rate of 1.2% in 2015, 1.6% in 2016 and 1.3% in 2017. Vodaforne had average growth rates of 1.5%, 0.8% and 1.3% in the three respective years [75].

Kenya

The Communications Authority of Kenya (CAK), reports that in Kenya, Airtel, the Free Basics carrier is 2nd in market share. The market is heavily dominated by Safaricom [76].

Airtel Kenya, has a market share of 17.2% and is second to Safaricom's 69.1% market share in Kenya. Airtel Kenya has been losing subscribers over the last few years inspite of offering Free Basics. At the same time, new competitors have arrived and taken its market share. Safaricom has continued to grow at a steady rate during the same period [77].

Table 4.5: Kenya Carrier Market Share in 2017

Carrier	Market Share
Safaricom	69.1%
Airtel	**15.3%**
Telkom	7.2%
Finserve	4.6%
Others	2.15%

In 2015, Airtel Kenya had a quarterly growth rate of 0.2%. Airtel had only one positive quarter in 2015, when they added Free Basics and lost subscribers in each quarter. Safaricom, the leader in the market had a growth rate of 3.1%. Finserve had just entered the market [77].

In 2016, Airtel has a negative growth rate of -2.0%. In the same year Finserve grew by 19.7% and Safaricom grew 4.3%. Telkom had a quarterly growth rate 6.1% in 2016 [76].

In 2017, Airtel had a negative growth rate of -3.4%. Finserve grew by 8.0% and Safaricom had a quarterly growth rate of 3.9% [76].

Mozambique

In Mozambique, the National Institute of Communications of Mozambique (INCM) has not regularly published numbers regarding the telecommunications market. The most recent reports from them only provide data till 2014, which is before the launch of Free Basics and hence not useful for this thesis. However, a consultation firm, Eaglestone Securities reports that the partially state-owned and Free Basics Carrier Mcel leads the market [78].

Unfortunately, we do not have quarterly or monthly growth rates for carrier operators in Mozambique. However, we do know from the Eagleston Securities report that the market share for Mcel has been falling. Mcel had 65.2% market share in 2014, which has fallen to 53.7% in 2017. Vodacom has had an exceptional growth rate of 20% per year and in 7 years gained 31.4% of the market share in Mozambique. Movitel had 10% of the market share in 2014 and has focused on gaining subscribers by targeting rural markets [78].

Table 4.6: Mozambique Carrier Market Share in 2017

Carrier	Market Share
Mcel	**53.7%**
Vodacom	31.4%
Movitel	14.9%

Table 4.7: Nigeria Carrier Market Share in 2017

Carrier	Market Share
MTN	36.14%
Globacom	26.39%
Airtel	**25.74%**
9mobile	11.72%

Nigeria

The Nigerian Communications Commission reports that as of 2017, the Free Basics carrier Airtel was 3rd in terms of market share [79].

Airtel Nigeria has had steady growth rates but has not been able to compete with the other carriers in the market. Airtel and Globacom have had lower growth rates, with newer competitor 9mobile and market leader MTN having the higher growth rates.

In 2015, Airtel had an average quarterly growth rate of 1.5%. Globacom had a growth rate of 0.2%. Most of the new subscribers were drawn to MTN or 9mobile. In 2015, MTN had a growth rate of 10.3% and 9mobile had a growth rate of 8.3% [79].

In 2016, Airtel had a similar growth rate of 1.4% and Globacom of 0.1%. MTN and 9mobile had growth rates of 5.2 and 4.5% similarly [79].

In 2017, Airtel had an average quarterly growth rate of 3.8% and had a major increase in growth rate in the 4th quarter. The growth rate was 7.53% in that quarter, also the same quarter Airtel introduced Free Basics to Nigeria.

During the same time, MTN had a growth rate of 3.8%, Globacom of 2.19% and 9mobile of 4.4% [79].

Table 4.8: Rwanda Carrier Market Share in 2017

Carrier	Market Share
MTN	42.28%
Tigo	38.93%
Airtel	**18.77%**

Rwanda

In Rwanda, the Free Basics carrier Airtel is 3rd of 3 mobile carriers as reported by the Rwanda Utilities Regulatory Agency (RURA) [80].

The Rwandan telecom market has not seen major growth in the last three years. The penetration rate is 77% and has increased only slightly since 2015. That is reflected in the subscriber growth rates for the mobile carriers in Rwanda.

In 2015, Airtel had a 2.2% average monthly subscriber growth rate. The market leaders Tigo and MTN had a growth rate of 1.4% and 1.8% respectively.

In 2016, Airtel had an average monthly growth rate of 1.34%. There was no difference discernable in July of 2016, when Airtel introduced Free Basics to Rwanda. The growth rate for that month was 2.6%. The growth rates for MTN and Tigo were 0.35% and 1.12% respectively. In 2017, Airtel had an average monthly growth rate of 1.5%. During the same years MTN and Tigo had growth rates of 1.9% and 0.5% respectively [80].

South Africa

Similar to Mozambique, The Independent Communications Authority of South Africa (ICASA) reports are lacking. Consultation firm Blycroft Publishing reported that in 2017, the Free Basics carrier in South Africa, Cell C was 3rd in market share [81].

Due to a lack of data from the ICASA, we do not have mobile carrier subscriber growth rate data stretching to 2015. The data from 2016 shows that there has not been a large growth in the market.

Table 4.9: South Africa Carrier Market Share in 2017

Carrier	Market Share
Vodacom	42.49%
MTN	35.23%
Cell C	**18.61%**
Telkom	5.11%

Vodacom and MTN had a growth rate of 5.6% and 7.2% in 2016 respectively. The carrier Cell C, that offers Free Basic in South Africa, had a growth rate of 3.9%. Telkom, a newer entrant to the market had a growth rate of 21%.

Tanzania

In Tanzania, the Tanzania Communications Regulatory Authority reports show a very unique situation. The market is more open and has more competing mobile carriers. The top three carriers by market share, all offer Free Basics in Tanzania. It is the only country where three carriers offer Free Basics in the list of selected countries [82]. This unique situation, coined as a "Tanzanian Devil", will be discussed in more depth in the succeeding chapter.

The Tanzanian telecom market, similar to that of Rwanda is matured. The penetration rate is 74% and has increased annually between 1-2% for the last 3 years.

In 2015, Vodacom had a monthly subscriber growth rate of 0.8%, Tigo had a rate of 0.4% and Airtel had a growth rate of 1.1%. Most of the new subscribers were attracted to the new market entrants Zantel and Halotel who had growth rates of 3.4% and 2.8% respectively.

In 2016, the leading carriers by market share started losing subscribers. Airtel had a negative rate of -0.6% and Tigo of -1.8%. Vodacom continued to grow at a rate of 1.1%. Zantel also lost market share at the rate of -3.7%. Halotel continued to grow at 3.3%.

In 2017, Airtel, Tigo and Zantel continued to lose subscribers. Airtel and Tigo had a

Table 4.10: Tanzania Carrier Market Share in 2017

Carrier	Market Share
Vodacom	**32.91%**
Tigo	28.33%
Airtel	**27.46%**
Halotel	10.04%
Zantel	2.10%
Others	1.38%

negative growth rate of -1.6% and -2.9% respectively. Vodacom retained its market dominance with a growth rate of 0.6%. Halotel grew at a rate of 5.2% while Zantel lost subscribers at a rate of -2.5%.

CHAPTER 5
INFERENCES AND ANALYSIS

Using the data analyzed in the previous chapter, as well as from other sources, this chapter will analyze the impact of Free Basics and answer the research questions posed in chapter second.

5.1 Impact on Users

One of the most striking observations from the survey data is the extent of the digital divide in the surveyed countries. Only half of all respondents were aware of the Internet and less than a third used the Internet. This is a huge barrier to connecting populations in emerging economies. Individuals would not seek to reap the benefit of the Internet if they are not aware of its existence or advantages.

Keeping that in mind, the individuals who do use the Internet, value social media very highly. Internet penetration in emerging economies is still at a low rate. The first exposure to the Internet for most individuals is through the need to be connected on a social media platform. The Internet experience for these first-time users is social media. In fact, many of them believe that social media is the Internet, specifically Facebook is the Internet [29].

In such an environment, a service that offers access to Facebook without any data charges does seem appealing. And individuals who value social media were attracted to it. The survey shows how Free Basics users use and value social media more than Internet users who are not on Free Basics. This could reveal the impact of Free Basics on the users, which was the first research question stated earlier in the chapter.

Data costs are another factor that should be kept in mind, while trying to understand the appeal of Free Basics. Almost half the respondents in the survey said that data costs were the biggest limitation to Internet access. The literature has shown the relative high

costs of data in emerging economies and especially the seven countries the survey covers. Furthermore, in a society where most individuals are not online, the Internet is viewed as a luxury and not a necessity. It is tougher to validate costs for Internet access in this scenario.

Social media usage has strong network effects, which reinforces usage and perceived importance from the users, as described by Saxton and Wang [83]. Free Basics may contribute to this effect and create a lock-in with Facebook and the other Free Basics applications. Users have the option of paying to access the open Internet or use a social media website they already value highly. Furthermore, in traditional Internet usage, linking and sharing leads users to other websites. An article shared by a friend on Facebook would lead the users to a news website and the user would spend time reading the article there. However, with Free Basics, accessing that third-party website would lead to data charges. This creates more incentive to stay within the Free Basics application and could reinforce the lock-in.

In fact, a considerable number of users, said they have a second sim card from a Free Basics provider solely for the ”free social media”. Users would have to opt for dual sim mobile phones, maintain two mobile phones or continuously switch between the two sim cards for this to be viable. This shows the value attached to zero-rated content offered through Free Basics.

Earlier, this thesis hypothesized that users who are using Free Basics would be more willing to plan their Internet usage according to their location. If their data plan charges them extra for websites outside the Free Basics application, they would want to wait till they are on a Wi-Fi at home, work or a public place to use the Internet. However, the survey results show that is not the case. Users on Free Basics are no more likely to wait till they are in a Wi-Fi zone to access the Internet. These users do consider the cost of Internet access to be a limitation, so it is unlikely they are browsing the Internet without heeding to the costs. Therefore, it must be the case that these users are content in their usage of the Internet with Free Basics. Furthermore, not only are they not accessing websites outside

of Free Basics, they are using a stripped-down version of Facebook with limited photo and no video content. Free Basics users are willing to use a simpler version of a website, with limited access to broader Internet, than pay for data or wait till they have access to Wi-Fi.

It could be argued however, that users on Free Basics do not end up using more social media because of Free Basics but have migrated or are attracted to Free Basics because of their liking for social media. In a free market, the users who value social media higher would be attracted to the zero-rated content and they would opt for those carriers. This argument will be better addressed after analyzing the mobile carriers.

5.2 Impact on Mobile Carriers

The second research question addressed the impact of Free Basics on the mobile carriers. The five carriers across the seven countries studied, provide access to Free Basics on their network. They do not get any financial compensation from Facebook as part of this deal. Ergo, the only economic advantage of offering Free Basics is as a market differentiator and attract new subscribers.

The data consumption on the application does not provide any monetary benefit to the carriers and could potentially be a burden on their network. Facebook and other websites zero-rated on Free Basics can be data-intensive applications. Video and image content are the main contributors to the large amount of data consumed by the typical Facebook application. However, the Facebook app on the Free Basics platform does not load videos and most images. Predominantly, it is a text heavy application. This means that the carriers are not providing a large amount of free data. The data consumed by Free Basics would only be a marginal burden on the networks.

Free Basics offers carriers the opportunity to attract new customers at a marginal cost. However, the data from the carriers and industry regulators show that Free Basics is not really instrumental in adding new consumers. As seen in the previous chapter, none of the carriers that offer Free Basics are doing better than their competitors in the same country.

In fact, Airtel a carrier that offers Free Basics in five of the seven countries, is losing subscribers in most of them.

Typically, Free Basics is offered by a carrier looking to increase its market share. However, none of the cases studied seem to show that. In five of the seven countries, the carriers that offer Free Basics, do not have a large amount of market share. The subscriber numbers show that Free Basics is not helping them grow subscribers. In Nigeria, it would be premature to judge the market however, as Free Basics was first offered as a service in 2017. The two countries where the market leaders offer Free Basics are Tanzania and Mozambique. The Tanzanian market will be looked at in the subsequent section.

In Mozambique, the service is offered by market leader, Mcel who have over half the market share. However, in the last few years Mcel's market share suffered a precipitous drop, with the addition of newer entrants in the market. In 2015, Mcel added Free Basics to stop this decline, but it did not have the desired effect. Their market share fell from 65.2% to 53.2% in 2 years.

An interesting observation from the data, was the increase in new subscribers in the financial quarters or months when a mobile carrier introduced Free Basics in the country. An increase in the number of new customers was seen distinctly with carriers Tigo in Ghana and Airtel in Ghana, Kenya and Nigeria. At the same time, no significant increases were seen for the other two countries we have monthly data for - Tanzania and Rwanda. While four data points are not enough to make a statistically sound observation, it is important to note that the markets in Ghana, Kenya and Nigeria are currently growing, whereas they have been stagnant in Tanzania and Rwanda. It may be that in growing markets, new subscribers are attracted to the zero-rating service, but it is not a sustained effect after there is more information regarding the program and other factors start to play a role.

5.2.1 The Tanzanian Devil

As noted earlier, Tanzania is in a unique situation amongst the seven countries. All of the top three mobile carriers, Vodacom, Tigo and Airtel, offer Free Basics. In this scenario, the selling proposition of Free Basics, as a market differentiator, is negated. Moreover, the introduction of Free Basics has given them no discernible advantage, as smaller carrier Halotel has continued to grow at much higher rates than either of the top three. In fact, Tigo and Airtel lost consumers in the last year.

This situation resembles a Bertrand paradox. A Bertrand paradox describes a market where firms sell the same homogenous commodity with identical costs of production and distribution. The sole differentiator here is price. Demand becomes infinitely price-elastic in this case. If any firm sets a higher price than the market, they give up the entire market to their competitors [84].

While there are many conditions and limitations to the Bertrand paradox, there are clear parallels to the market in Tanzania. The three market leaders Vodacom, Tigo and Airtel are selling a homogenous product. Mobile carrier services are usually identical in their basic form and are only augmented by promotions and costs. In the case of Free Basics, the promotion of zero-rated access to social media is also identical. The three market leaders are very close in cost too [85]. The market is undercut by Vodacom with lower prices, therefore providing them a sustained growth of consumers. For Airtel and Tigo, who cannot match these prices, Free Basics becomes a burden which forces them to give out free data, but they do not gain any new customers either.

None of the competitors are able to drop Free Basics either, as they believe that consumers value it. However, after studying the carriers in other nations and looking at the survey data, it seems that Free Basics is not a major factor in consumer choice. Carriers that do not offer Free Basics are able to succeed and there is no major advantage for carriers that carry Free Basics. The next section will analyze this claim in the context of the consumer preferences revealed in the survey responses.

5.3 The Digital Divide and User Migration

The survey responses show that there are a number of users who value social media and the zero-rated services. However, the results from the analysis of regulator and carrier data show that there is no sustained increase in the number of subscribers for a carrier when it offers Free Basics.

These results help answer the third research question - addressing the migration patterns across the three groups represented in Figure 2.1. First, it does not seem that Free Basics contributes to bridge the digital divide in the seven countries studied. The carriers are not adding new subscribers because of Free Basics, which means that they are not bringing new users online. It may be possible that there are new users attracted to Free Basics because of the zero-rating, but that is not seen in the growth rate as a similar number of users are leaving the carrier. However, in countries like Tanzania and Rwanda we have seen the penetration rate remain stagnant. In fact, three of the leading carriers by number of subscribers in Tanzania offer Free Basics, but that has not brought more individuals online.

From the survey data, it would seem that there is no major movement from individuals who are on Free Basics to using the open Internet. The users on Free Basics are satisfied with their limited content and do not seek the open Internet. They value social media more than users on other carriers and also use it more often. Even though they have the option of accessing the open Internet through Wi-Fi zones, they are no more likely to do so than others. In fact, a small percentage of users go out of their way to access the zero-rated content by getting a second SIM card.

The migration in the other direction, from using the open Internet to using Free Basics is tougher to study. Keeping in mind that Free Basics did not bring in many new subscribers, existing subscribers on a carrier were able to access Free Basics on the introduction of the service. We do not have survey data from that time, so we cannot narrow down how many of those users used the Internet at the time and for how many users Free Basics was their

first experience of the Internet. A tentative claim could be made that as the introduction of Free Basics was not instrumental in increasing the penetration rates or bridging the digital divide, it must not have been users' first experience of the Internet. This would imply that users have migrated from using the open Internet to using Free Basics and being satisfied with the zero-rated service. However, this claim would require more data to support it.

The data from the mobile carriers also helps us make a claim regarding the effect of Free Basics on user behavior. The survey data shows that there is a strong correlation between considering social media to be the most important online activity and being on carrier that offers Free Basics. It also showed a correlation between social media being the most frequent online activity and being on a Free Basics carrier. This may be because of the network effects and the lock-in generated by free access to Facebook and the other websites on the service, but not to websites on the open Internet. Another possibility, as discussed in the previous paragraph, is that users who prefer social media and use it frequently have migrated to the carriers that offer Free Basics.

This would require more data to make the claim confidently but considering that Free Basics has not led to the introduction of newer subscribers on the carriers it is unlikely that users who prefer social media have migrated to those carriers. This would support the hypothesis that Free Basics contributes to the lock-in effect, as the users who had access to the service were more likely to use and value social media. But, to make this claim we would require the preferences of users before they were given access to the Free Basics service.

CHAPTER 6
CONCLUSION

The goal of this thesis was to provide an empirical, bias-free analysis of zero-rating services and Free Basics. As detailed in previous chapters, the rhetoric around these issues is dominated by private interests and value imposition, instead of a fact-based discussion.

Understanding all aspects of this issue is a mammoth task. There are many factors regarding Free Basics that need to be studied more to make conclusions regarding the service. One of them is the privacy concern with the service. All activity on Free Basics is redirected through Facebook's servers, making it inefficient as well as giving Facebook data regarding an individual's browsing behavior beyond their activities on Facebook. Only now are the implications of the data gathered by Facebook, on its website, being understood. The personal data accessible through Free Basics would be more expansive than the one in question with Cambridge Analytica [86].

Regulators and policy professionals need to look at all aspects of zero-rating services like Free Basics when they draft their laws. While this thesis found a strong correlation between social media lock-in and Free Basics, there was no conclusive proof of a causal relationship. Even if a causal relationship can be proved through future work, is that grounds enough to claim it is a societal harm? What is the impact of extended social media usage on mental health? If individual users prefer to remain inside FB's walled garden, are they really better off if a regulator tells them they must pay additional fees for data usage in order to induce them to have access to the broader internet? These are the kinds of questions that should be rigorously answered before drafting net neutrality legislation. However, emerging economies should make these decisions independently, without succumbing to European notions of egalitarianism.

This thesis does show conclusively that there is no discernible advantage for mobile

carriers that offer Free Basics. The discussions around Free Basics usually revolve around users, and there is a notion of "saving" users from Free Basics. What this thesis has shown, is that it is not the users, but the carriers that need to be saved from Free Basics! In an attempt to be a market differentiator, carriers offer free data to a heavily used application, and miss out on possible revenue. This cost does not repay them with newer customers. In fact, as we saw in the "Tanzanian Devil", sometimes it is not even a market differentiator. It would serve these carriers well to reevaluate the utility they gain from this agreement with Facebook.

Appendices

APPENDIX A

THE RIA SURVEY

The survey used in this thesis was provided from Research ICT Africa (RIA), a non-profit working to bridge the digital divide in Africa. Generously, they provided raw data from their 2017 survey for the benefit of this thesis. I would like to voice my gratitude to Enrico Calandro and Onkokame Mothobi for their cooperation. Below is the survey methodology provided by RIA to better understand the survey and the challenges in undertaking such a task.

Listing

1. Listing all households in EA (enumerated area).
2. Determine sampling interval.
3. Determine random starting point.

Bases for random selection of households and informal business

1. Each Structure in EA gets an ID A structure may have more then one household.
2. There may also be businesses.
3. It may be empty.
4. All households and businesses within structure will be listed (separate row in paper form).

The Listing Process

1. Arrive at EA and determine the boundary by walking around it and checking the various landmarks.

2. Mark letters in chalk on the road or elsewhere easily visible.

3. Allocate enumerators walking routes.

4. Enumerators each fill their own listing form.

5. The structure IDs used by enumerators must correspond with the route: someone walking from A to B would use structure IDs AB001, AB002 etc. so that there will be no duplication of structure IDs.

6. Enumerators write the Structure ID in easily visible chalk on the gate or house wall and enter the household and business information in listing form after consultations with owners and residents.

7. Once listing is complete the field manager walks through EA to make sure no structures were overlooked. Every structure must have a structure ID.

SRS BY FIELD MANAGER

1. The field manger takes all the listing forms for the EA and staples them together with the cover page (Table 1) on top. The order of the listing form does not play any role. But once stapled together the order must remain.

2. The field manages then allocates serial numbers to each household and each business on the listing form. Households starting with HH1, HH2, etc and business with B1, B2, etc.

3. The last serial number indicates the number of households in the EA and the number of businesses in the EA. These two figures are recorded on the cover page (cover page).

4. The field manager then determines the sampling interval by dividing the number of households in the EA by the target number of households to be interviewed.

5. The interval is always rounded down.

6. The field manager then notes down the time in hours and minutes and adds the digits together. 13:47 = 1+3+4+7=15, for example. This number is the random starting point. The first selected HH is HH15. The next HH15+ the sampling interval, and so forth.

7. The interval can be continued from the start if the end of the listing form is reached and the required number of households have not yet been interviewed.

8. Random replacements are selected by continuing with the sample interval. For example, if there are there are 257 households in the EA, the last one selected household isHH253, and the sample interval is 10, then the next selected household is HH6 and after HH6 would be HH16 etc.

9. Should the same number coincidentally be selected again, then generate a new random starting point.

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